	Application No.	Applicant(s)	
Notice of Allowability	10/816,165	KIM ET AL.	
	Examiner	Art Unit	
	Lana N. Le	2618	

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *4/01/04*.

2. ☒ The allowed claim(s) is/are *1-20 and 39-46*.

3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☒ All   b) ☐ Some*   c) ☐ None of the:

      1. ☒ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

    * Certified copies not received: _____ .

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

    (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached

        1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.

    (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of

        Paper No./Mail Date _____.

    Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)

2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)

3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____

4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material

5. ☐ Notice of Informal Patent Application (PTO-152)

6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .

7. ☒ Examiner's Amendment/Comment

8. ☒ Examiner's Statement of Reasons for Allowance

9. ☐ Other _____.

EXAMINER'S AMENDMENT

1.   An examiner's amendment to the record appears below. Should the changes

and/or additions be unacceptable to applicant, an amendment may be filed as provided

by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be

submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview

with applicant's representative, Frank Chau, on 06/21/06.

2.   The application has been amended as follows:

-    cancel nonelected claims 21-38.

-    in claim 15, after ---mixer of claim-----, delete ---15----, and add ---10---.

REASON FOR ALLOWANCE

3.   The following is an examiner's statement of reasons for allowance:

Regarding claim 1, Ugajin et al (US 6,871,057) disclose a frequency mixer (fig. 5)

comprising:

a first differential amplifier (differential gain transistors 81, 83) for amplifying a

first pair of input signals having a first frequency to output a first differential output signal

(RF signals in differential form; col 1, lines 50-60);

a second differential amplifier (82, 84) for amplifying a second pair of input

signals orthogonal to the first input signals to output a second differential output signal,

the second pair of input signals having a substantially same frequency as the first

frequency (col 1, line 50 - col 2, line 5);

a mixer (2) for mixing the differential output signal, and a first pair of drive signals

(LO-I, LO-Q) having a second frequency and a second pair of drive signals (LO-I2, LO-

Q2) having the second frequency (col 1, line 55 - col 2, line 5).

Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order

harmonic of a local oscillation signal (col 3, lines 25-29).

However, Ugajin et al and the cited prior art do not disclose:

a subtracter for subtracting the second differential output signal from the first

differential output signal to output a subtracted output signal; mixing the subtracted

signal and the second pair of drive signals being orthogonal to the first pair of drive

signals wherein the mixer has a sub-harmonic double balanced mixing mode, and for

outputting a pair of output signals orthogonal to each other, wherein at least one

harmonic is cancelled from the output signals.

Regarding claim 10, Ugajin et al disclose a frequency mixer (fig. 8) comprising:

a first differential amplifier (RFIN transistors 81, 83) for amplifying a first pair of

input signals having a first frequency for outputting a first differential output signal (RF

output in differential form; col 1, lines 50-60)

a second differential amplifier (82, 84) for amplifying a second pair of input

signals orthogonal to the first pair input signals having the first frequency and for

outputting a second differential output signal (RF signal in differential form; col 1, lines

50-60);

a mixer for mixing the subtracted output signal and a pair of drive signals having a second frequency (col 1, line 55 – col 2, line 5).

Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order harmonic of a local oscillation signal (col 3, lines 25-29).

However, Ugajin et al, Suematsu et al and the cited prior art do not disclose:

a subtracter for subtracting the second differential output signal from the first differential output signal and for outputting a subtracted output signal; and

a mixer for mixing the subtracted output signal and a pair of drive signals having a second frequency in a double balanced mixing mode for outputting a pair of output signals orthogonal to each other wherein at least one harmonic is cancelled.

Regarding claim 17, Pickering et al (US 6,242,965) disclose a frequency mixer comprising:

a differential amplifier (156) for amplifying a first pair of radio frequency (RF) input signals having a first frequency and for generating a first current signal at a first node and a second current signal at a second node (col 2, lines 11-21);

a mixer (155) for mixing the current signals applied to the first and the second node with a first pair of drive signals and a second pair of drive signals (col 2, lines 4-10). Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order harmonic of a local oscillation signal (col 3, lines 25-29).

However, Pickering et al, Suematsu et al and the cited prior art fail to disclose:

the first and second pair of drive signals being orthogonal to each other and having a second frequency, in a sub-harmonic double balanced mixing mode, adapted to output

a pair of output signals orthogonal to each other, a harmonic being cancelled from the output signals; a harmonic rejection circuit for processing a second pair of input signals orthogonal to the first pair of input signals and for generating a third current signal at the first node and a fourth current signal at the second node, the second pair of input signals having a substantially same frequency as the first frequency.

Regarding claim 39, Ugajin et al disclose a method comprising:

providing a first differential signal (via 81, 83) having a first frequency(fig. 5);

providing a second differential signal (via 82, 84);

mixing (via 2) the differential signals with and a first pair of drive signals and a second pair of drive signals (col 1, line 50 – col 2, line 5).

Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order harmonic of a local oscillation signal (col 3, lines 25-29).

However, Ugajin et al, Suematsu et al and the cited prior art fail to disclose:

the second differential signal orthogonal to the first differential signal, and having a substantially same frequency as the first frequency, subtracting the second differential signal from the first differential signal to output a subtracted signal;

mixing the subtracted signal and the drive signals orthogonal to each other having a second frequency in a sub-harmonic double balanced mixing mode, to output a pair of output signals being orthogonal to each other, a harmonic being cancelled from the output signals.

Regarding claim 40, Ugajin discloses a method comprising:

amplifying (via 81, 83) a first pair of input signals (RF signals in differential Form) having a first frequency to output a first differential signal (col 1, lines 50-60);

amplifying a second pair of input signals (via 82, 84) to the first pair of input signals to output a second differential signal (col 1, line 50 – col 2, line 5);

mixing the differential signal (via 2) with LO signals (col 1, line 55 –col 2, line 5). Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order harmonic of a local oscillation signal (col 3, lines 25-29).

However, Ugajin et al, Suematsu et al and the cited prior art fail to disclose:

the second pair of input signals having a substantially same frequency as the first frequency; subtracting the second differential signal from the first differential signal to output a subtracted signal; and

mixing the subtracted signal with a pair of drive signals having a second frequency, in a sub-harmonic double balanced mixing mode, to output a pair of output signals orthogonal to each other, wherein a harmonic is cancelled in the output signals.

Regarding claim 41, Ugajin et al discloses a method comprising:

amplifying (via 81, 83) a first pair of input signals, having a first frequency, to output first and second input signals (col 1, lines 50-60);

mixing (via 2) the amplified signals with drive signals, wherein the first pair of drive signals and the second pair of drive signals (LO signals) have a second frequency (col 1, line 55 - col 2, line 5).

Pickering et al (US 6,242,965) disclose a frequency mixer a differential amplifier (156) for amplifying a first pair of radio frequency (RF) input signals having a first frequency

and for generating a first current signal at a first node and a second current signal at a

second node (col 2, lines 11-21).

However, Ugajin et al, Pickering et al and the cited prior art fail to disclose:

subtracting respectively a third and fourth current signals from a first and second current

signals to output a first and second subtracted signals wherein a second pair of input

signals orthogonal to the first pair of input signals have a substantially same frequency

as the first frequency; and mixing the first and the second subtracted signals, and a first

pair of drive signals and a second pair of drive signals orthogonal to each other, in a

sub-harmonic double balanced mixing mode, to output a pair of output signals

orthogonal to each other.

Regarding claim 42, Ugajin et al disclose frequency mixer comprising:

a first amplifier (81, 83) for amplifying a first input signal having a first frequency,

to output a first amplified signal (col 1, lines 50-60);

a second amplifier (82, 84) for amplifying a second input signal to output a second

amplified signal (col 1, line 50 – col 2, line 5).

Suematsu et al disclose a mixer (11-12, 14-15; fig. 5) for suppressing even order

harmonic of a local oscillation signal (col 3, lines 25-29).

However, Ugajin et al, Suematsu et al and the cited prior art fail to disclose:

the second input signal having a substantially same frequency as the first frequency;

the second input signal orthogonal to the first input signal, a subtracter for subtracting

the second amplified signal from the first amplified signal, and for outputting a

subtracted signal; and a mixer for mixing the subtracted signal with a drive signal having

a second frequency, in sub-harmonic double balanced mixing mode, to output a output

signal, a harmonic being cancelled from the output signal.

Conclusion

4.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Lana N. Le whose telephone number is (571) 272-7891.

The examiner can normally be reached on M-F 9:30-18:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Edward F. Urban can be reached on (571) 272-7899. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

6-26-06

LANA LE
PRIMARY EXAMINER

Lana Le